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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/663,796

09/17/2003

Chung-jeon Lee

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8789

7590

10/20/2004

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EXAMINER

STEPHENS, JUANITA DIONNE

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/663,796

Applicant(s)

LEE ET AL.

Examiner

Juanita D. Stephens

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Amendment filed 9/17/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-12 and 23-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 31-36 is/are allowed.
- 6) ☒ Claim(s) 1-4, 8, 9, 11, 12, 23-27, 29 and 30 is/are rejected.
- 7) ☒ Claim(s) 5-7, 10 and 28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/835,348.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 13-22 canceled.

Specification

1. The disclosure is objected to because of the following informalities:

In the "Cross Reference To Related Application" section, line replace "Application Serial No." with --No. 6,649,074--.

In claim 25, line 9 replace "resister" with --resistor--.

Appropriate correction is required.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

The specification to which the oath or declaration is directed has not been adequately identified. See MPEP § 602.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "substrate having ink feed grooves at edges of said substrate to supply ink to said ink supply path" recited in claim 27 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

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replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 8-9, 12, 25, 29, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Silverbrook (US Patent No. 6,019,457).

Silverbrook discloses a bubble-jet type ink jet printhead (Figs. 12 and 17), comprising: 1) a substrate (130) (col 7, ln 43) having a manifold (nozzle channel 114) and an ink chamber (thermal chamber 115) formed therein, said manifold and said ink

chamber being connected to each other and both being formed as recesses in a top surface of the substrate (130) (as seen on Fig. 17), 2) a nozzle plate (over coat 142) located on said top surface of said substrate to cover the manifold and the ink chamber (col 8,ln 66-col 8, ln 4), said nozzle plate being perforated by a nozzle hole located directly above a center portion of said ink chamber(as seen on Fig. 11), 3) a heater (120) (col 7, ln 49) being disposed on the nozzle plate and being disposed around the nozzle hole on the nozzle plate (as seen in Fig. 11), 4) electrodes (contacts 123) electrically connected to the heater (col 8,lns 2-8), said ink chamber forming a substantially concave surface in said substrate (as seen on Fig. 17), 4) wherein said ink chamber being essentially hemispherical in shape (col 10, lns 10-11), 5) an ink channel (nozzle barrel 113) disposed in said top surface of said substrate between said manifold and said ink chamber, said ink channel being integral with and connecting said manifold with said ink chamber (as seen on Fig. 17), 6) said ink chamber being formed deeper in said top surface of said substrate than said ink channel, 7) wherein the nozzle plate comprises: an insulating layer (132) covering said substrate, wherein an opening for an ink chamber and an opening for said manifold are formed at positions corresponding to the center portion of the ink chamber and said manifold, respectively, and a protective layer (136,144) covering said insulating layer and covering said opening for said manifold, said protective layer having an opening above said ink chamber serving as said nozzle hole for said printhead (col 8,lns 15-25; col 9, lns 10-13), 8) wherein said protective layer is comprised of a polyimide film (col 8,lns 15-16; col 9, lns 10-11), 9) wherein the heater (120 and 440) is "O" shaped and the electrodes are electrically

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coupled to two diametrically opposite points of said "O" shaped heater, respectively (col 7, lns 28-33; col 9, lns 19-27), 10) an ink supply path (113 and 114) formed in one surface of said substrate (130), said ink supply path being connected to a plurality of ink chamber (115) formed in said one surface of said substrate, a nozzle plate (142) disposed on said one surface of said substrate, said nozzle plate being perforated by a plurality of nozzle holes (111), each nozzle hole corresponding to a corresponding one of said plurality of ink chambers, and a plurality of heater resistors (120), each one of said plurality of heater resistors corresponding to corresponding one of said plurality of ink chambers, each heater resistor formed on said nozzle plate, each heater resistor disposed above a corresponding ink chamber (as seen in Fig. 17), 11) each of said plurality of ink chambers having an essentially bowl-shape (as seen on Fig. 17), and 12) said bowl shape being essentially an outer portion of a hemisphere in shape (as seen on Fig. 17).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (US Patent No. 6,019,457) in view of Abe et al. (US Patent No. 5,367,324).

Silverbrook discloses a bubble-jet type ink jet printhead (Figs. 12 and 17), comprising: 1) a substrate (130) (col 7, ln 43) having a manifold (nozzle channel 114)

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and an ink chamber (thermal chamber 115) formed therein, said manifold and said ink chamber being connected to each other and both being formed as recesses in a top surface of the substrate (130) (as seen on Fig. 17), 2) a nozzle plate (over coat 142) located on said top surface of said substrate to cover the manifold and the ink chamber (col 8,ln 66-col 8, ln 4), said nozzle plate being perforated by a nozzle hole located directly above a center portion of said ink chamber(as seen on Fig. 11), 3) a heater (120) (col 7, ln 49) being disposed on the nozzle plate and being disposed around the nozzle hole on the nozzle plate (as seen in Fig. 11), 4) electrodes (contacts 123) electrically connected to the heater (col 8,lns 2-8), said ink chamber forming a substantially concave surface in said substrate (as seen on Fig. 17), 4) wherein said ink chamber being essentially hemispherical in shape (col 10, lns 10-11), 5) an ink channel (nozzle barrel 113) disposed in said top surface of said substrate between said manifold and said ink chamber, said ink channel being integral with and connecting said manifold with said ink chamber (as seen on Fig. 17), 6) said ink chamber being formed deeper in said top surface of said substrate than said ink channel, 7) wherein the nozzle plate comprises: an insulating layer (132) covering said substrate, wherein an opening for an ink chamber and an opening for said manifold are formed at positions corresponding to the center portion of the ink chamber and said manifold, respectively, and a protective layer (136,144) covering said insulating layer and covering said opening for said manifold, said protective layer having an opening above said ink chamber serving as said nozzle hole for said printhead (col 8,lns 15-25; col 9, lns 10-13), 8) wherein said protective layer is comprised of a polyimide film (col 8,lns 15-16; col 9, lns 10-11), 9)

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wherein the heater (120 and 440) is "O" shaped and the electrodes are electrically coupled to two diametrically opposite points of said "O" shaped heater, respectively (col 7, lns 28-33; col 9, lns 19-27), 10) an ink supply path (113 and 114) formed in one surface of said substrate (130), said ink supply path being connected to a plurality of ink chamber (115) formed in said one surface of said substrate, a nozzle plate (142) disposed on said one surface of said substrate, said nozzle plate being perforated by a plurality of nozzle holes (111), each nozzle hole corresponding to a corresponding one of said plurality of ink chambers, and a plurality of heater resistors (120), each one of said plurality of heater resistors corresponding to corresponding one of said plurality of ink chambers, each heater resistor formed on said nozzle plate, each heater resistor disposed above a corresponding ink chamber (as seen in Fig. 17), 11) each of said plurality of ink chambers having an essentially bowl-shape (as seen on Fig. 17), and 12) said bowl shape being essentially an outer portion of a hemisphere in shape (as seen on Fig. 17). Silverbrook does not disclose wherein the heater is "C" shaped and the electrodes are coupled to both ends of the "C" shaped heater, respectively.

Abe et al. at least teaches is "C" shaped heaters (heating element 184) and the electrodes (359) are coupled to both ends of the "C" shaped heater, respectively (col 14, lns 27-28. It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Silverbrook by substituting the "C" shaped heater as taught to be old by Abe et al. for the purpose of providing openings in the center of the heating element, which allows the collapsing air bubbles and

associated concentrated shock waves to pass through the heating element without affecting the life of the heating element.

8. Claims 23, 24, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (US 6,019,457) in view of Keefe et al. (US 5,953,029).

Silverbrook discloses a bubble-jet type ink jet printhead (Figs. 12 and 17), comprising: 1) a substrate (130) (col 7, ln 43) having a manifold (nozzle channel 114) and an ink chamber (thermal chamber 115) formed therein, said manifold and said ink chamber being connected to each other and both being formed as recesses in a top surface of the substrate (130) (as seen on Fig. 17), 2) a nozzle plate (over coat 142) located on said top surface of said substrate to cover the manifold and the ink chamber (col 8,ln 66-col 8, ln 4), said nozzle plate being perforated by a nozzle hole located directly above a center portion of said ink chamber(as seen on Fig. 11), 3) a heater (120) (col 7, ln 49) being disposed on the nozzle plate and being disposed around the nozzle hole on the nozzle plate (as seen in Fig. 11), 4) electrodes (contacts 123) electrically connected to the heater (col 8,lns 2-8), said ink chamber forming a substantially concave surface in said substrate (as seen on Fig. 17), 4) wherein said ink chamber being essentially hemispherical in shape (col 10, lns 10-11), 5) an ink channel (nozzle barrel 113) disposed in said top surface of said substrate between said manifold and said ink chamber, said ink channel being integral with and connecting said manifold with said ink chamber (as seen on Fig. 17), 6) said ink chamber being formed deeper in said top surface of said substrate than said ink channel, 7) wherein the nozzle plate comprises: an insulating layer (132) covering said substrate, wherein an opening for an

ink chamber and an opening for said manifold are formed at positions corresponding to the center portion of the ink chamber and said manifold, respectively, and a protective layer (136,144) covering said insulating layer and covering said opening for said manifold, said protective layer having an opening above said ink chamber serving as said nozzle hole for said printhead (col 8,lns 15-25; col 9, lns 10-13), 8) wherein said protective layer is comprised of a polyimide film (col 8,lns 15-16; col 9, lns 10-11), 9) wherein the heater (120 and 440) is "O" shaped and the electrodes are electrically coupled to two diametrically opposite points of said "O" shaped heater, respectively (col 7, lns 28-33; col 9, lns 19-27), 10) an ink supply path (113 and 114) formed in one surface of said substrate (130), said ink supply path being connected to a plurality of ink chamber (115) formed in said one surface of said substrate, a nozzle plate (142) disposed on said one surface of said substrate, said nozzle plate being perforated by a plurality of nozzle holes (111), each nozzle hole corresponding to a corresponding one of said plurality of ink chambers, and a plurality of heater resistors (120), each one of said plurality of heater resistors corresponding to corresponding one of said plurality of ink chambers, each heater resistor formed on said nozzle plate, each heater resistor disposed above a corresponding ink chamber (as seen in Fig. 17), 11) each of said plurality of ink chambers having an essentially bowl-shape (as seen on Fig. 17), and 12) said bowl shape being essentially an outer portion of a hemisphere in shape (as seen on Fig. 17). Silverbrook does not disclose 1) said ink chamber and said manifold not perforating said substrate, recited in claim 23, 2) said substrate being absent any perforations through said substrate, recited in claim 24, 3) said ink supply path

comprising a manifold extending along a length of said one surface of said substrate, said manifold being connected to a plurality of ink channels formed in said one surface in said substrate, each of said plurality of ink channels being connected to a corresponding one of said plurality of ink chambers, wherein neither of said plurality of ink chambers, said plurality of ink channels and said manifold perforates said substrate, recited in claim 26, and 4) said substrate having ink feed grooves at edges of said substrate to supply ink to said ink supply path, recited in claim 27.

Keefe et al. at least teaches an edge feed feature (as seen in Figs. 7 and 8) in which said ink chamber (72) and said manifold not perforating said substrate (28), said substrate being absent any perforations through said substrate (col 7, lns 44-52), said ink supply path comprising a manifold extending along a length of said one surface of said substrate, said manifold being connected to a plurality of ink channels formed in said one surface in said substrate, each of said plurality of ink channels being connected to a corresponding one of said plurality of ink chambers, wherein neither of said plurality of ink chambers, said plurality of ink channels and said manifold perforates said substrate, said substrate having ink feed grooves at edges of said substrate to supply ink to said ink supply path. It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Silverbrook by substituting the edge feed feature as taught to be old by Keefe et al. for the purpose of providing a smaller substrate in which the length of the substrate can be shortened due to the substrate structure now being less prone to cracking or breaking without a central hole, providing a substrate that dissipate more heat, since the ink flows across the back

of the substrate and around the edges of the substrate to draw heat away from the back of the substrate, and finally allowing the ink to flow more rapidly into the chambers, which improves the frequency response and reduces crosstalk.

Allowable Subject Matter

9. Claims 5, 6, 7, 10, and 28 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 7 will be allowed when claim 6 is rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

The limitation of wherein a lip is formed in said substrate between said ink chamber and said manifold, recited in claim 5. This invention solves the problem of preventing the creation of satellite droplets, preventing crosstalk with adjacent nozzles, preventing back flow of ink in the opposite direction and shortening the ink refill time.

The limitation of wherein the ink chamber having an elliptic cross section, and one side of the semimajor axis of said ink chamber is directly joined to said manifold, recited in claim 6. This invention solves the problem of preventing the creation of satellite droplets, preventing crosstalk with adjacent nozzles, preventing back flow of ink in the opposite direction and shortening the ink refill time.

The limitation of a bubble guide and a droplet guide, said droplet guide being an extension of said nozzle hole with walls extending towards a bottom surface of said ink

chamber, said bubble guide being a gap in said substrate near said heater and exterior to said droplet guide, said bubble guide providing a space for a bubble to grow inside and ink chamber, recited in claim 10. This invention solves the problem of preventing the creation of satellite droplets, preventing crosstalk with adjacent nozzles, preventing back flow of ink in the opposite direction and shortening the ink refill time.

The limitation of a plurality of tubing segments formed on a side of said nozzle plate facing said substrate, each of said plurality of tubing segments corresponding to corresponding ones of said plurality of nozzles holes, said tubing segments serving to extend said corresponding nozzle holes from said side of said nozzle plate facing said substrate toward a bottom of corresponding ink chambers formed in said one surface of said substrate, recited in claim 28. This invention solves the problem of preventing the creation of satellite droplets, preventing crosstalk with adjacent nozzles, preventing back flow of ink in the opposite direction and shortening the ink refill time.

11. Claims 31-36 are allowed.

12. The following is a statement of reasons for the indication of allowable subject matter:

The limitation of a plurality of nozzle hole extensions protruding from said bottom side of said nozzle plate to bottoms of corresponding ones of said plurality of ink chambers, recited in independent claim 31. This invention solves the problem of preventing the creation of satellite droplets, preventing crosstalk with adjacent nozzles, preventing back flow of ink in the opposite direction and shortening the ink refill time.

Contact Information

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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

A handwritten signature in black ink, appearing to read "Juanita D. Stephens". The signature is fluid and cursive, with the first name "Juanita" being more prominent than the last name "Stephens".

October 17, 2004

Juanita D. Stephens
Primary Examiner
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